

Appl. No. 10/729,384
Amdt. dated October 24, 2006
Reply to Office action of July 24, 2006

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended) An electrochemical cell comprising:

a membrane electrode assembly;

a first reactant flow field plate for providing a first reactant flow field disposed on one side of the membrane electrode assembly;

a first seal disposed between the first reactant flow field plate and the membrane electrode assembly for impeding leakage of process fluids of the electrochemical cell;

a first gas diffusion layer disposed between the first reactant flow field plate and the membrane electrode assembly for diffusing reactant from the first reactant flow field to the membrane electrode assembly and comprising a porous body for diffusing the reactant from the reactant flow field to the membrane electrode assembly;

a second reactant flow field plate for providing a second reactant flow field disposed on the other side of the membrane electrode assembly; and,

a peripheral support structure for supporting the membrane electrode assembly at a periphery between the first reactant flow field and the first seal to impede substantial distortion of the membrane electrode assembly between the first reactant flow field and the first seal;

wherein the peripheral support structure comprises an edge portion of the first gas diffusion layer surrounding the porous body, and

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wherein a thickness of the edge portion is reduced from one side of the porous body to provide a step between the porous body and the edge portion.

Claim 2 (cancelled)

Claim 3 (cancelled)

Claim 4 (currently amended) An electrochemical cell as claimed in claim 31 wherein

the first gas diffusion layer comprises a first side facing the reactant flow field plate and a second side facing the membrane electrode assembly;

the step is on the first side of the first gas diffusion layer; and,

the edge portion abuts the seal.

Claim 5 (currently amended) An electrochemical cell as claimed in claim 31 wherein

the first gas diffusion layer comprises a first side facing the reactant flow field plate and a second side facing the membrane electrode assembly;

the step is provided on the second side of the first gas diffusion layer; and,

the peripheral support structure further comprises a sealing insert provided on the edge portion to impede leakage of the process fluids.

Claim 6 (original) An electrochemical cell as claimed in claim 5 wherein the sealing insert has a thickness substantially equal to a height of the step, such that the second side of the first gas diffusion layer and the sealing insert provide a substantially flat surface for supporting the membrane electrode assembly.

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Claim 7 (original) An electrochemical cell as claimed in claim 6 wherein the seal is a sealing gasket and the sealing insert comprises a slot for accommodating the sealing gasket.

Claim 8 (original) An electrochemical cell as claimed in claim 7 wherein the sealing insert has a thickness substantially equal to a thickness of the porous body and has an insert step for engaging the step on the gas diffusion layer.

Claim 9 (original) An electrochemical cell as claimed in claim 5 wherein the sealing insert is substantially impermeable to the process fluids.

Claim 10 (original) An electrochemical cell as claimed in claim 9 wherein the sealing insert comprises a silk screened gasket.

Claim 11 (currently amended) A method of impeding leakage of process fluids from an electrochemical cell having a membrane electrode assembly, a first reactant flow field plate for providing a first reactant flow field disposed on one side of the membrane electrode assembly, a seal disposed between the first reactant flow field plate and the membrane electrode assembly for impeding leakage of process fluids of the electrochemical cell, and a second reactant flow field plate for providing a second reactant flow field disposed on the other side of the membrane electrode assembly; the method comprising:

providing a gas diffusion layer disposed between the first reactant flow field and the membrane electrode assembly; and,

providing the gas diffusion layer with an edge portion for supporting the membrane electrode assembly at a periphery between the reactant flow field and the seal to impede substantial distortion of the membrane electrode assembly between the reactant flow field and the seal.

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wherein the edge portion surrounds a porous body, the porous being permeable to the process fluids, and the edge portion is thinner than the porous body.

Claim 12 (original) The method as defined in claim 11, wherein the edge portion is substantially impermeable to process fluids.

Claim 13 (original) The method as defined in claim 11, wherein the edge portion comprises a liquid silicone gasket for impeding leakage of the process fluids.

Claim 14 (original) The method as defined in claim 11, wherein the edge portion comprises a silk screened gasket for impeding leakage of the process fluids.

Claim 15 (cancelled)

Claim 16 (currently amended) The method as defined in claim ~~45~~11, wherein

the edge portion is substantially impermeable to process fluids;

the porous body comprises a first side and a second side; and,

the thickness of the edge portion is reduced from the second side to provide a step in the second side.

Claim 17 (original) The method as defined in claim 16 wherein the step of providing the gas diffusion layer comprises installing the gas diffusion layer such that the first side faces the membrane electrode assembly and the edge portion faces the seal.

Claim 18 (original) The method as defined in claim 16 wherein

the step of providing the gas diffusion layer comprises installing the gas diffusion layer such that the second side faces the membrane electrode assembly;

the method further comprises providing a sealing insert on the edge portion to impede leakage of process fluids, and

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the sealing insert is substantially impermeable to process fluids and engages the step of the edge portion.

Claim 19 (original) The method as defined in claim 18 wherein the sealing insert has an insert thickness substantially equal to a height of the step and the method further comprises installing the sealing insert and the gas diffusion layer such that the second side of the gas diffusion layer and the sealing insert provide a substantially flat surface for supporting the membrane electrode assembly.

Claim 20 (currently amended) A gas diffusion layer for an electrochemical cell comprising

a first side for receiving process fluids of the electrochemical cell;

a second side opposite to the first side;

a porous body for diffusing the process fluids from the first side to the second side, the porous body being electrically conductive, and

an edge portion surrounding the porous body, wherein the edge portion is substantially impermeable to the process fluids,

wherein the edge portion is thinner than the porous body.

Claim 21 (cancelled)

Claim 22 (currently amended) A gas diffusion layer as claimed in claim 2420, wherein the edge portion comprises a silk screened gasket for impeding leakage of the process fluids.

Claim 23 (original) A gas diffusion layer as claimed in claim 20, wherein the edge portion comprises a silk screened gasket for impeding leakage of the process fluids.

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Claim 24 (original) A gas diffusion layer as claimed in claim 20, wherein the edge portion comprises a silicone gasket.

Claim 25 (original) A gas diffusion layer as claimed in claim 20, wherein a thickness of the edge portion is reduced from one side of the porous body to provide a step between the porous body and the edge portion.

Claim 26 (original) A gas diffusion layer as claimed in claim 20, wherein the gas diffusion layer is a single unitary body.

Claim 27 (original) A gas diffusion layer for an electrochemical cell comprising

a first side for receiving process fluids of the electrochemical cell;

a second side opposite to the first side;

a porous body for diffusing the process fluids from the first side to the second side, the porous body being electrically conductive, and,

an edge portion surrounding the porous body, wherein a thickness of the edge portion is reduced from one side of the porous body to provide a step between the porous body and the edge portion.

Claim 28 (original) A gas diffusion layer as claimed in claim 27, wherein the edge portion is substantially impermeable to the process fluids.

Claim 29 (original) A gas diffusion layer as defined in claim 28, wherein the edge portion comprises one of a liquid silicone gasket for impeding leakage of the process fluids, and a silk screen gasket for impeding leakage of the process fluids.

Claim 30 (original) A gas diffusion layer as claimed in claim 27, wherein the gas diffusion layer is a single unitary body.